

Work Order ID 86936

\*86936\*

Page 1

July-09-12 2:51:38 PM

Item ID: D212-664-207

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12 Start Qty: 1.00 \*1\*

Cust Item ID:

Required Date: 7/06/12 Req'd Qty: 1.00 \*1\*

Customer:

Reference:

Approvals: Process Plan: MLJDate: 12/07/10 Tooling:

Date:

Run Start \*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D212-664-247

Rev B (DEO)

0.00

100

\*100\*

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D212-664-207 CHG002

110

Pick Kit

0.00

\*110\*

Packaging

Packaging

Memo

0.00

Packaging

120

BENDING MACHINE - CROSSTUBES

0.00

\*120\*

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D212-664-247 using CNC bender program and Folio FT

D. J. M. J. 12-11-15

MO 12/11/05

MO 12/11/06

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**Work Order ID 86936****\*86936\***

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Item ID: D212-664-207

Accept

**\*N900040100\***

Setup Start

**\*NS1\***

Revision ID:

Stop

**\*NS2\***

Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12

Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 7/06/12

Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan: \_\_\_\_\_

Date: \_\_\_\_\_

Tooling: \_\_\_\_\_

Date: \_\_\_\_\_

Run Start

**\*NR1\***

QC: \_\_\_\_\_

Date: \_\_\_\_\_

SPC (Y/N): \_\_\_\_\_

Date: \_\_\_\_\_

Stop

**\*NR2\***Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

130

QC15- Crosstube Dimensional Check

0.00

**\*130\***

QC

Memo

0.00

Quality Control

DAS  
03  
04  
11  
2-89

12-11-6

140

Crosstubes

0.00

**\*140\***

Crosstubes

Memo

0.00

Crosstubes

1-Drill Rivet holes as per Dwg D212-664-247 using DT8972.\*\*\*Use T-Pin\*\*\*

2-Drill pilot holes in tube as per Dwg D212-664-247 using DT8550 and DT8551

3-Ream hole to finish size in tube as per Dwg D212-664-247

4-\*\*\* WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE\*\*\* Deburr  
& Inspect for surface damage. Repair damage within limits as per Dwg D212-664-247

5-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-247

Rm

12-11-7

Rm

12-11-7

Rm

12-11-7

**Dart Aerospace Ltd**

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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Item ID: D212-664-207 Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: Stop \*NS2\*  
 Item Name: Crosstube Low Standard Aft  
 Start Date: 7/06/12 Start Qty: 1.00 \*1\* Cust Item ID:  
 Required Date: 7/06/12 Req'd Qty: 1.00 \*1\* Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150 *150* QC Quality Control	QC5- Inspect part completeness to step on W/O  Memo *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***	0.00  0.00				1			DAS 05 8-83 12 11 07
160 *160* HandFXtube Hand Finishing Crosstubes	HandFXtube Memo *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***  1- CLEAN CROSSTUBE WITH WASH'N WIPE	0.00  0.00				1	0	0	12-11-8
180 *180* Outsource2 Outsource process - NDT	Outsource process - NDT per QSI038 4.1  Memo *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***  Liquid Penetrant Inspection as per QSI 038 Issue P/O: 18365 LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order	0.00  0.00							CZ 12/11/08 ①

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Item ID: D212-664-207

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\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12 Start Qty: 1.00 \*1\*

Cust Item ID:

Required Date: 7/06/12 Req'd Qty: 1.00 \*1\*

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
206	QC7-Inspect Chemical Conversion Coat	0.00				1			DAS 05/12/11 9-89
*206*									
QC	Memo	0.00							
Quality Control	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
210		0.00							
*210*	Crosstubes					1	0	0	12
Crosstubes	Memo	0.00							12-11-9
Crosstubes	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1-Rivet and assemble Cuffs with T-Pin in the through bolt holes as per Dwg D212-664-247. with Sika flex in Between tube & Cuff								
	A/R SIKAFLEX -241/-291 BATCH: 123353								

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Item ID: D212-664-207 Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: Stop \*NS2\*  
 Item Name: Crosstube Low Standard Aft  
 Start Date: 7/06/12 Start Qty: 1.00 \*1\* Cust Item ID:  
 Required Date: 7/06/12 Req'd Qty: 1.00 \*1\* Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
215	QC5- Inspect part completeness to step on W/O	0.00							
*215*									DAS 05 9-89 12 11 09
QC	Memo	0.00							
Quality Control	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	***Inspect cuff with T-Pin***								
220	Spray Painting per QSI005 4.2	0.00							
*220*	SprayPaint								DAS 05 9-89 12 11 11
Spray Painting	Memo	0.00							
	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1-Prime inside and outside crosstube as per QSI 005 4.2								
	2-Paint outside crosstube with White Imron as per QSI 005 4.2								
	PRIME:								
	Start Time: 6:00								
	Finish Time: 7:00								
	PAINT:								
	Start Time: 11:00								
	Finish Time: 12:00								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

# Work Order ID 86936

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Item ID: D212-664-207 Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: Stop **\*NS2\***  
 Item Name: Crosstube Low Standard Aft  
 Start Date: 7/06/12 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 7/06/12 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
230	QC14- Inspect Spray Paint	0.00							
<b>*230*</b>									
QC	Memo	0.00							
Quality Control	Wrap in plastic bag to protect from scratches								
240		0.00							
<b>*240*</b>	Crosstubes								
Crosstubes	Memo	0.00							
Crosstubes	1- Assemble as per Dwg D212-664-247								
	1-Abrade mating surfaces of support and crosstube with 400 grit sandpaper, clean the area with 4105S wash 'n' wipe								
	2-Install supports with Proseal 890 per DSI9563 and QSI 015 A/R Proseal 890 Batch: <u>123103</u>								
	3- Torque bolts as per dwg								

12-11-11 (✓)

1 0 0 12-11-14

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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July-09-12 2:51:38 PM

Item ID: D212-664-207

Accept

\*N900040100\*

Setup Start

\*NS1\*

Revision ID:

Stop

\*NS2\*

Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12

Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 7/06/12

Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start

\*NR1\*

Stop

\*NR2\*

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

250

QC5- Inspect part completeness to step on W/O

0.00

\*250\*

QC

Memo

0.00

Quality Control

255

Pick Kit

0.00

\*255\*

Packaging

Memo

0.00

Packaging

260

QC4- 100% Inspect kits for completeness

0.00

\*260\*

QC

Memo

0.00

Quality Control

DAS  
05  
9-83

12-11-15

DAS  
15  
9-83

12-11-15

*[Handwritten signature]*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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# Work Order ID 86936

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July-09-12 2:51:38 PM

Item ID: D212-664-207 Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: Stop \*NS2\*  
 Item Name: Crosstube Low Standard Aft  
 Start Date: 7/06/12 Start Qty: 1.00 \*1\* Cust Item ID:  
 Required Date: 7/06/12 Req'd Qty: 1.00 \*1\* Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
270	Packaging	0.00							
*270*									
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D212-664-207								
280	QC21- Final Inspection - Work Order Release	0.00							
*280*									
QC	Memo	0.00							
Quality Control									

MF  
12-11-19

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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# Picklist Print

July-09-12 2:51:37 PM

Page 1

Work Order ID: 86936

Parent Item: D212-664-207

Parent Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12

Required Date: 7/06/12

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 07.09.12 EC verified by: JLM  
IPP Rev:B ECN 1100p 08-01-11 DD verified by: EC  
IPF Rev:C ECN 1121 08-02-25 DD verified by: eC  
IPP Rev: D QC5 replaced by QC15 at step 5 KJ Verified by: cc

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D212-664-207TRNRevA Crosstube Turning Detail		Manufactured	No		B89856	110	Each	0.0000	1	①		MD 12/11/05	
D3660-1 CUFF		Manufactured	No			140	Each	16.0000	2	2			
				<u>Location</u>		<u>Loc Qty</u>	<u>Loc Code</u>						
				LG	B 89249	4							
					80359	4							
				ST482		12							
					53501	1							
					76983	11							
CR3212-4-06 CHERRY RIVET		Purchased	No			220	Each	372.0000	44	④④	44	AB 12-11-9	
				<u>Location</u>		<u>Loc Qty</u>	<u>Loc Code</u>						
				ST330		319							
					120521	119							
					122141	200							
				ST331		53							
					112492	18							
					112794	8							
					119717	27							

W/O:		WORK ORDER CHANGES					
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Work Order ID: 86936

Parent Item: D212-664-207

Parent Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12

Required Date: 7/06/12

Start Qty: 1.00

Required Qty: 1.00

D3595-063-530  
RUBBER CUSHION

Manufactured No

240 Each 137.0000

4 (4) 4 AB 12-11-13

Location

Loc Qty

Loc Code

LG

98

79932

18

82656

80

MAT052

39

63407

6

67185

6

70067

18

72745

2

75783

7

D2940-1  
Support

Manufactured No

240 Each 31.0000

2 (8) 2 AB 12-11-13

Location

Loc Qty

Loc Code

LG052

31

79118

11

82657

20

MS21920-28

Purchased No

240 Each 88.0000

4 (4) 4 AB 12-11-13

Clamp(per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

FG

5

105884

5

LG050

25

116839

2

118713

4

120054

2

121067

17

LG051

58

121440

8

122204

50

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Page 3

Work Order ID: 86936

Parent Item: D212-664-207

Parent Item Name: Crosstube Low Standard Aft

Start Date: 7/06/12

Required Date: 7/06/12

Start Qty: 1.00

Required Qty: 1.00

D3428-1 Manufactured No

255 Each 33.0000

1 93489

Placard

Location Loc Qty Loc Code

ST042 33  
78933 2  
81881 9  
83582 10  
85228 12

MS21042U6 Purchased No

255 Each 491.0000

6 122441

Nut

Location Loc Qty Loc Code

ST300 491  
117677 25  
118384 3  
118927 48  
119075 215  
120308 200

AN960JD616 Purchased No

255 Each 0.0000

18 1123265

Washer

AN6-40A Purchased No

255 Each 124.0000

4 122416

Bolt

Location Loc Qty Loc Code

ST342 124  
120187 66  
120833 4  
121584 4  
121827 50

AN6-41A Purchased No

255 Each 65.0000

2 122407 12/11/10

Bolt

Location Loc Qty Loc Code

ST342 65  
120423 35  
121825 30

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Shop Packet Print

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**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

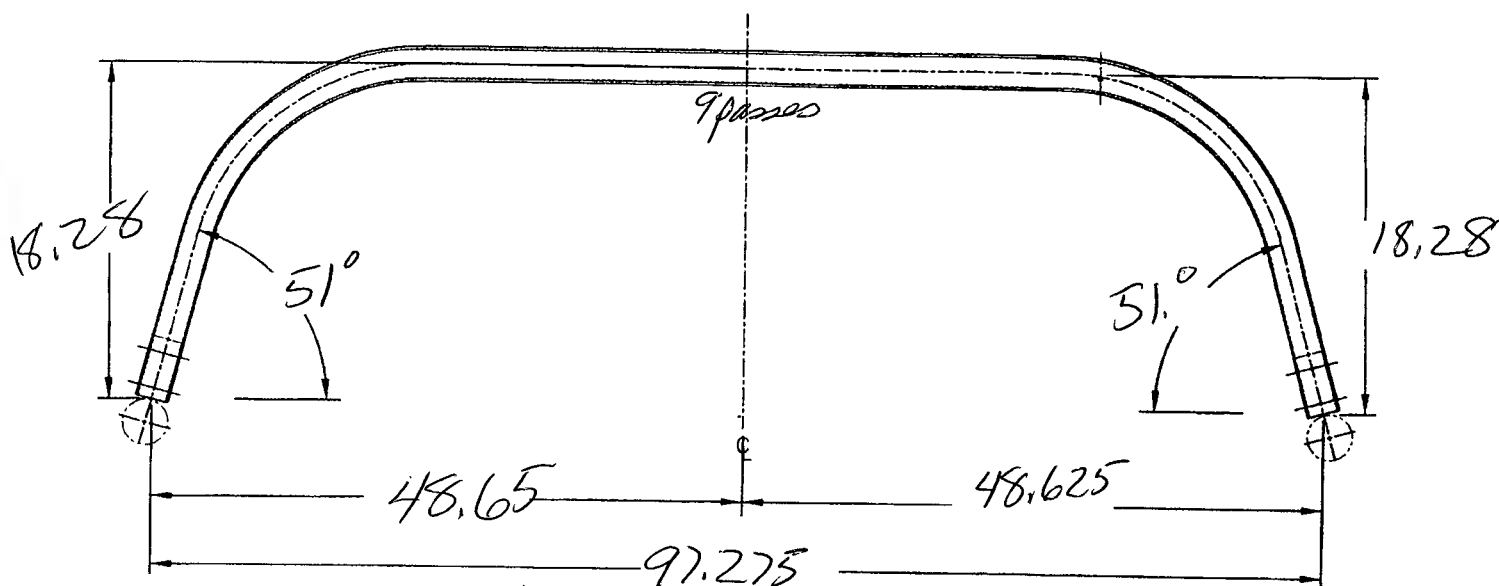
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DART AEROSPACE LTD		Work Order:	86936
Description: Crosstube Low Aft (205/212)		Part Number:	D212-664-207
Inspection Dwg: D212-664-247 Rev: B		Page 1 of 1	

Required Dimension	Min	Max
Height	18.16	18.42
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62
Bending Passes	8	--
Crushing	--	6% / 10%



	Side A	Side B
Bending Passes	17	16
Crushing	7.54%	7.116%
9 passes for middle Band		
Comments		

QC15 Inspection	DAS 03/09	DAS 11/08
Date	12-11-06	12-11-06

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	
B	10.04.01	Dwg Rev updated	KJ	
C	12.04.16	Added bending, crushing dimensions	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



Item	Qty -247	Qty -247B	Part Number	Description
1	X		D212-664-247	CROSSTUBE ASSEMBLY (205/212 LOW AFT)
2		X	D212-664-247B	CROSSTUBE ASSEMBLY (214 LOW AFT)
3	1	1	D6008-132	CROSSTUBE
4	2	2	D2940-1	SUPPORT
5	4	4	D3595-063-530	RUBBER CUSHION
6	2	2	D3660-1	CUFF
7	4	4	MS21920-28	CLAMP (OR MS21920-30)
8	44	44	CR3212-4-06	RIVET (OR M7885/3-4-06)
9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC 299-947-100, TYPE II, CLASS 2 ADHESIVE)
10	A/R	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

# GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6008-132  
FINISHED LENGTH = 128.268±0.020 (BEFORE BENDING/TRIMMING)
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF  
USING VIBRATING STYLUS.
- WEIGHT: D212-664-247 = 36.6 lbs (PER IIN-D212-664)  
D212-664-247B = 36.6 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE
- WHEN MACHINING TAPER, RUN CUTTER OFF PART BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD  
BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6%  
BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF  
D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER  
INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D2940-1  
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE  
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS  
DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE  
UNACCEPTABLE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS  
NOT BOTTOMED-OUT AFTER TORQUING
- INSTALL D3660-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF  
SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE.  
SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER

NO. 86936 MW  
12/07/10

DEO ATTACHED

REV 11-614  
11.07.28

UNDER REVIEW

RELEASED  
2009-10-29  
MP

B	REVISE GENERAL NOTES/PART LIST, UPDATE TO CURRENT STANDARDS; ADD -247B (ZN C4-2, D5-2)	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF	DRAWING NO.	REV. B
CHECKED	RF	D212-664-247	SHEET 1 OF 4
MFG. APPR.	RF	TITLE	SCALE
APPROVED	RF	CROSSTUBE (205/212 LOW AFT)	NTS
DE APPR.	RF	COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL. IT IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COME OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	
DATE	09.09.30		

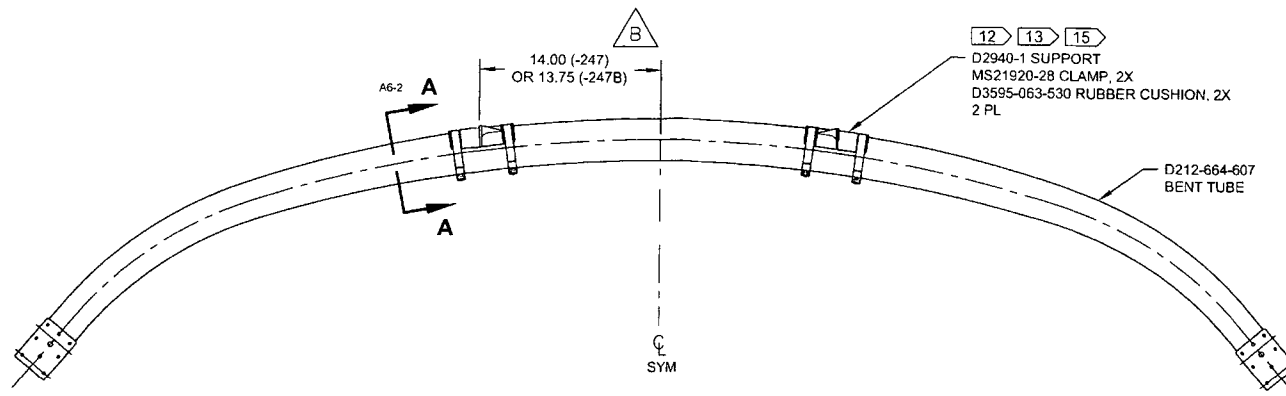
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

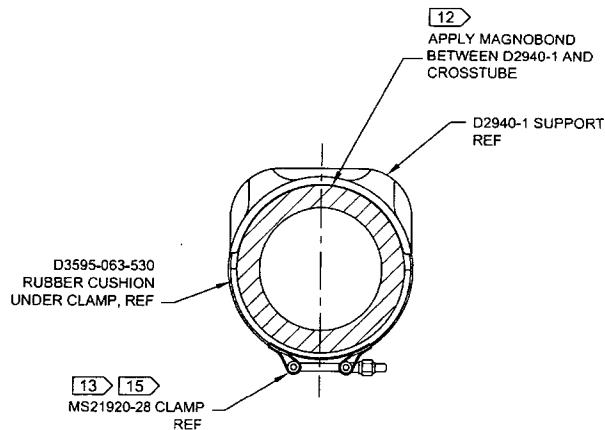
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



**D212-664-247/-247B  
ASSEMBLY DETAIL**



**SECTION A-A**  
SCALE 4X

DEO ATTACHED

11.07.25

UNDER REVIEW

RELEASED  
2009-10-29

DESIGN	97	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	<b>HAWKESBURY, ONTARIO, CANADA</b>	
CHECKED	97	DRAWING NO.	REV. B
MFG. APPR.	18	D212-664-247	SHEET 2 OF 4
APPROVED	140	TITLE	SCALE
DE APPR.	14	CROSSTUBE (205/212 LOW AFT)	NTS
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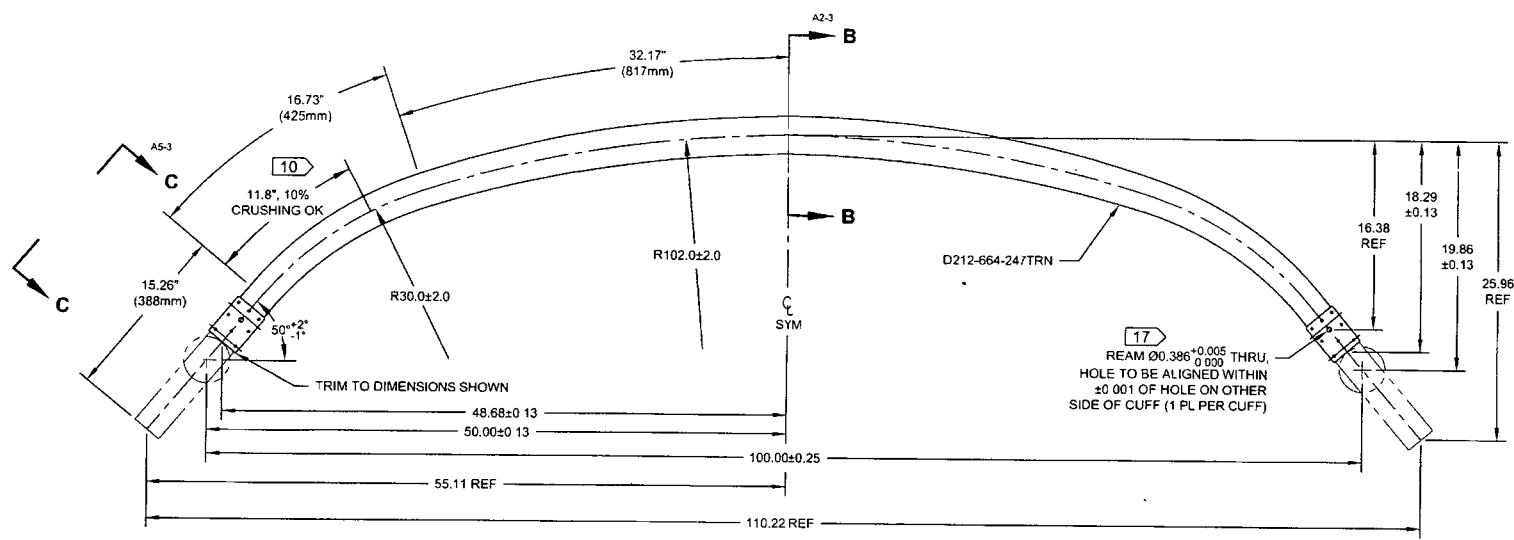
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

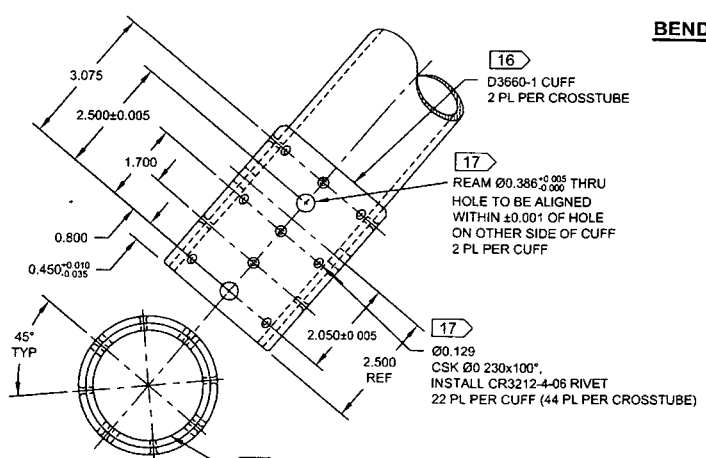
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

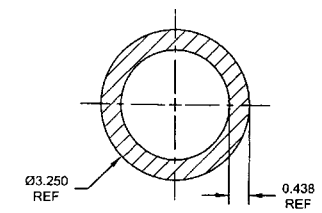
**NOTE:** Date & initial all entries



**D212-664-607**  
**BENDING AND DRILLING DETAIL** 10 B



**VIEW C-C: CUFF DETAIL** D7-3  
 SCALE 4X



**SECTION B-B** D4-3  
 SCALE 4X

**DEO ATTACHED**  
**UNDER REVIEW**  
 11.06.13

**RELEASED**  
 2009-10-29  
 WP

DESIGN	9	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9	DRAWING NO.	REV. B
MFG. APPR.	SS	D212-664-247	SHEET 3 OF 4
APPROVED	10	TITLE	SCALE
DE APPR.	11	CROSSTUBE (205/212 LOW AFT)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

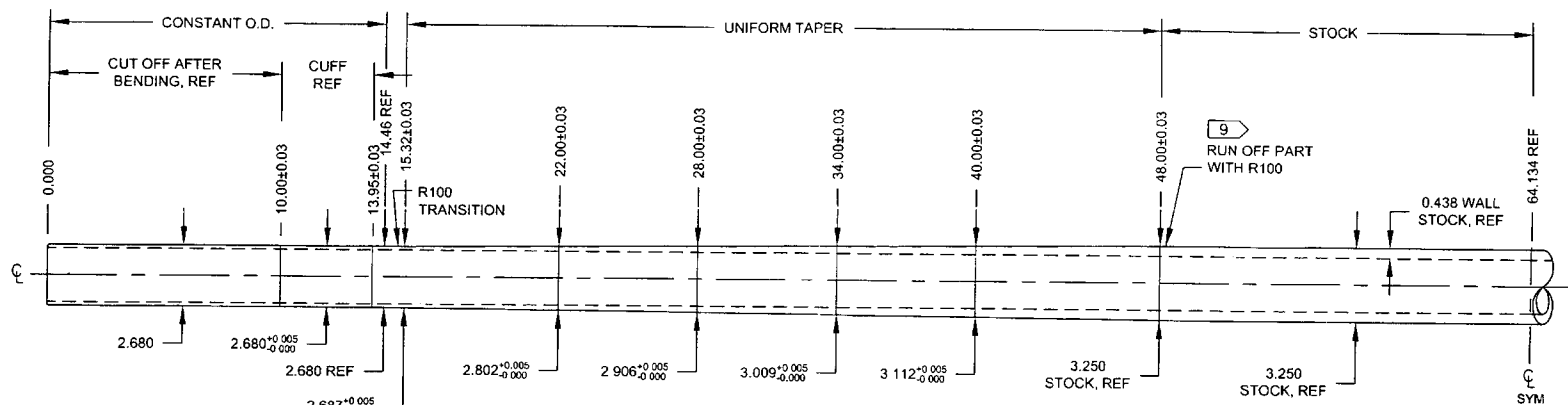
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

86936



**D212-664-247TRN  
TURNING DETAIL**

**DEO ATTACHED**

11.07.28

**UNDER REVIEW**

UP 1.06/13

**RELEASED**

2009-10-29

DESIGN	97	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	97	DRAWING NO.	REV. B
MFG. APPR.	15	D212-664-247	SHEET 4 OF 4
APPROVED	15	TITLE	SCALE
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DRAWING NO. D212-664-247	TITLE CROSSTUBE ASS'Y (205 LOW AFT)	REV. B	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-247-B-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN 90	CHECKED ASS	MFG. APPR. [Signature]	APPROVED [Signature]		DE APPR. [Signature]		
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/21		DATE 11.07.21		

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

IS:

Item	Qty -247	Qty -247B	Part Number	Description
9	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
---	-----	-----	----------------	---

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2940-1 SUPPORT: ABRABE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
[Signature]

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



# LIQUID PENETRANT TEST REPORT

P- 12683

CLIENT DART AEROSPACE DATE Nov 8/12 PAGE 1 OF 1  
ATTENTION ANDY ACUREN JOB NO. 188-12-CO 395 TIME AM ☒ PM ☐  
ADDRESS 1270 ABLEDEEN PO/WO NO. 18365  
HAWKES BULLY, ONT. WORK LOCATION Same  
ACCEPTANCE STD ASTM 1417/01-038 REV./DATE 2005  
PROJECT F.P.T. on CROSS TUBES  
ITEM(S) EXAMINED (7)

JOB DESCRIPTION SEE RESULTS PROCEDURE No. LT 002 REV./DATE 2008 TECHNIQUE No. LT 1012 REV./DATE 2008  
PART No. SEE RESULTS MATERIAL ALUMINUM THICKNESS VARIOUS  
SCOPE

## TEST DETAILS

METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N 16459 ☐ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT 2667 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER 420 MINIMUM DRY TIME >10 MIN. OTHER LABINO  
DEVELOPER SKD 52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N 1098866 CAL DUE DATE Nov 12 2012  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

## TEST SURFACE

SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

## RESULTS-

(☐ METRIC ☐ IMPERIAL)

ITEM	COMMENTS	ACCEPT	REJECT
1	CROSS TUBES - W.O. #		
1	" " 19020511	✓	
1	" " 89372	✓	
1	" " 77285	✓	
1	" " 86936	✓	
1	" " 12476	✓	
1	" " 92475	✓	
1	" " 602040	✓	

## Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE Andy Sheldon DTR # E-120255  
TECHNICIAN (SIGNATURE): A. Ke 11112 REPORT REVIEWED BY:  
NAME (PRINT): A. Ke 11112 NAME INITIALS  
1<sup>ST</sup> TECHNICIAN 2<sup>ND</sup> TECHNICIAN  
CGSB LEVEL 1 SNT LEVEL 1 CGSB LEVEL 1 SNT LEVEL 1  
CGSB REG. No 6606 CGSB REG. No 6606